Phytologia (February 1994) 76(2):106-114.

TAXONOMIC OVERVIEW OF *PODOCOMA* (ASTEREAE: ASTERACEAE), WITH THE INCORPORATION OF TWO SPECIES FROM *CONYZA*

Guy L. Nesom

Department of Botany, University of Texas, Austin, Texas 78713 U.S.A.

Donna Zanowiak

Department of Biology, University of Central Oklahoma, Edmond, Oklahoma 73034 U.S.A.

ABSTRACT

Two South American species formerly treated as *Conyza* are here transferred to the genus *Podocoma*: **P. notobellidiastrum** (Griseb.) Nesom, *comb. nov.* and **P. rivularis** (Gardner) Nesom, *comb. nov.* Except for their achenes with only a short neck instead of a filiform beak and their reduced number of pappus series, these two species closely resemble other species of *Podocoma*, here regarded as a genus of approximately nine species occurring primarily in southern Brazil, eastern Bolivia, Paraguay, Uruguay, and northern Argentina. *Podopappus* Hook. & Arn. is lectotypified as a synonym of *Podocoma*. The monotypic genera *Asteropsis* (= *Podocoma macrocephala*) and *Blakiella* (= *Podocoma bartsiifolia*) are distinct from *Podocoma*; the Australian genus *Ixiochlamys* also includes species that formerly have been treated as *Podocoma*.

KEY WORDS: *Podocoma*, *Conyza*, Astereae, Asteraceae

In independent investigations of relationships among genera of the tribe Astereae, we have observed that two South American species treated as *Conyza* L. are misplaced in that genus: *C. notobellidiastrum* Griseb. and *C. rivularis* Gardner. In their habit and general appearance, particularly their tendency for basally disposed leaves, clasping cauline leaves, and fibrous roots from a short rhizome, as well as more technical characters (below), these two species fit comfortably within the South American genus *Podocoma* Cass. Their relationship to *Podocoma* has not been recognized previously because their achenes

have only a short, incipiently formed neck and pappus of one series of bristles with a short outer series of setae (Figures 1: C and D); in contrast, achenes of typical *Podocoma* are characterized by a narrow, distinct beak (the apex often only attenuate in *P. bellidifolia* Baker) and pappus of bristles in 2(-3) series of even length (Figures 1: A and B).

Apart from the difference in achenial and pappus morphology, the separation of *Podocoma* and *Conyza* (with regard to the species under consideration) is more difficult, but the two genera represent separate phylads, and no other species of these two genera have been ambiguously intermixed in their taxonomy. The following comparison emphasizes their essential contrasting features.

PODOCOMA: phyllaries 1-veined without orange resin ducts accompanying the veins; disc corolla tube ca. 2/3 the total length of the corolla, opening into a non-indurate throat; collecting appendages of the disc style branches lanceolate; achene apex attenuate or constricted into a neck or beak (Figures 1: A,B,C, and D); pappus mostly in 2-3 series of equal length.

CONYZA: phyllaries 3-veined with orange resin ducts accompanying the veins; disc corolla tube ca. 1/3-1/4 the total corolla length, opening into a slightly to strongly indurate throat; collecting appendages of the disc style branches deltate; achene apex truncate, erostrate (Figures 1: E,F, and G); pappus mostly in a single series, usually without any outer series.

In the features noted above, *Conyza notobellidiastrum* and *C. rivularis* belong with *Podocoma*, even though they appear to represent a specialized element within that genus. The vestiture of these two species is relatively reduced, compared to other *Podocoma*; their achene length is at the small extreme for species of *Podocoma* but larger than those of *Conyza*; and their reduced pappus provides somewhat ambiguous evidence with respect to generic placement, but reduction of pappus occurs commonly within many genera of the tribe and family, and the pappus of *Conyza* usually is uniseriate, without an outer series.

We have maintained *Conyza notobellidiastrum* and *C. rivularis* as distinct species but the difference between them is small, apparently attributable entirely to differences in leaf shape and disposition. Intermediates can be found among the specimens we have examined (ca. 90 altogether, at MO, TEX, and US) and it is possible that only a single species is present. Field observations of populational variation in these plants will be critical in clarifying their systematic status.

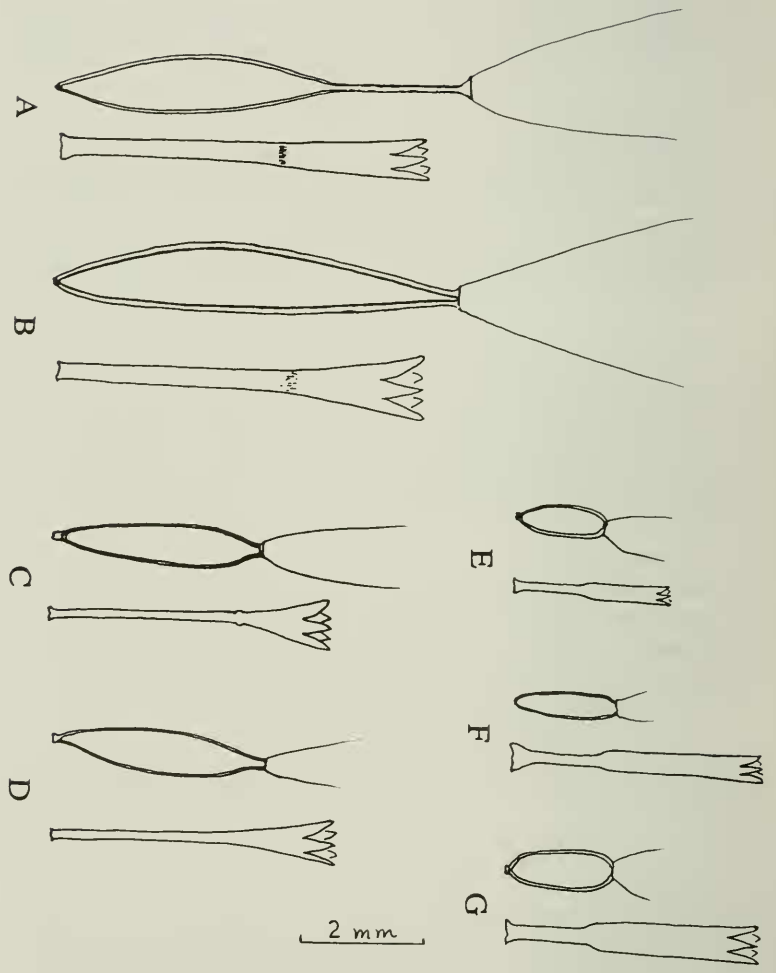

Figure 1. Achenial and pappus morphology of *Podocoma* and *Conyza*: A. *P. hieracifolia* (Poir.) Cass.; B. *P. bellidifolia*; C. *P. notobellidiastrum*; D. *P. rivularis*; E. *C. canadensis* (L.) Cronq.; F. *C. primulifolia* (Lam.) Cuatr. & Lourteig; and G. *C. trihecatactis* (S.F. Blake) Cuatr. The number and series of pappus bristles and their length is not indicated.

In a phylogenetic analysis of New World representatives of the subtribe Baccharidinae and other, putatively related, peripheral genera using restriction site variation in chloroplast DNA (Zanowiak 1991 and in prep.), *Conyza notobellidiastrum* is distantly separated from a strongly monophyletic group that consists of *Erigeron tenuis* Torr. & Gray, *E. strigosus* Muhl. *ex* Willd., and *Conyza bonariensis* (L.) Cronq. Instead, *C. notobellidiastrum* lies (in Zanowiak's analysis) within the Baccharidinae, between *Baccharis* L. and a monophyletic group consisting of *Archibaccharis* Heer. and *Heterothalamus* Less. On a morphological basis (Nesom in prep.), however, there is no apparent justification for regarding *C. notobellidiastrum* as especially closely related to *Baccharis* and its relatives, but at least the molecular evidence indicates that the phyletic position of this species is disjoined from that of *Conyza*.

The incorporation of *Conyza notobellidiastrum* and *C. rivularis* into *Podocoma* makes the practical identification of *Podocoma* as a genus slightly more difficult, but, as hypothesized here, an extraneous element is removed from *Conyza* and *Podocoma* becomes monophyletic. Following is a taxonomic summary of *Podocoma* expanded by the two species, with preliminary indications of synonymy. We also have constructed a preliminary and highly provisional key to species in an attempt to identify the primary nodes of variation, but the genus is in need of a revisionary study.

Podocoma Cass., Bull. Sci. Soc. Philom. Paris 1817:137. 1817. TYPE: *Podocoma hieracifolia* (Poir.) Cass.

Podopappus Hook. & Arn., Companion Bot. Mag. 2:50. 1836. LECTOTYPE (designated here): *Podopappus hirsutus* Hook. & Arn. (= *Podocoma hirsuta* [Hook. & Arn.] Baker).

Perennial herbs, usually coarsely pubescent, eglandular, rhizomatous with fibrous roots. Basal leaves often persistent, the cauline clasping, continuing unreduced upwards or sharply reduced in size above the base. Heads solitary or more commonly in a loose, corymbiform capitulescence; phyllaries in 3-5 strongly graduated series, stiffly indurate, narrowly lanceolate or oblong-lanceolate, greenish in the midportion, the midvein without accompanying orange resin ducts. Pistillate flowers in ca. 2-5 series, corollas white or purplish (yellow in *Podocoma bellidifolia* and *P. blanchetiana* Baker), with short (2-3 mm long), coiling ligules 0.5-0.8 mm wide or the ligules 1-2 mm long, filiform, and mostly erect. Disc flowers relatively few, hermaphroditic, fertile, the corollas with a long tube opening into a narrowly funnelform limb ca. 1/3 the corolla length, sometimes orange-veined, with deltate lobes; style branches with deltate to triangular collecting appendages. Achenes sparsely strigose, eglandular, strongly flattened with 2 marginal ribs, apically attenuate into a long, nearly filiform beak or short neck or sometimes with only a broad

gradually attenuate apex, (3-)4-6 mm long, including the neck; pappus of capillary bristles in 2(-3) series of even length, or 1 series of bristles with a short, outer series of setae in *P. notobellidiastrum* and *P. rivularis*. Chromosome number, $n=9$: reported for *P. notobellidiastrum* (Coleman 1968; Hunziker *et al.* 1989) and *P. hirsuta* (Coleman 1968).

PROVISIONAL KEY TO SPECIES AND TAXONOMIC SUMMARY

1. Achenes mostly 5-6 mm long, apically attenuate-tapered to a slender or broad neck or beak (Figures 1A, 1B); pappus 2-3 seriate; leaves minutely scabrous to harshly hirsute or hirsute-pilose. ..... (3)

1. Achenes mostly ca. 3 mm long, with short, barely distinct neck (Figures 1C, 1D); pappus 1-seriate, sometimes with scant outer series; leaves glabrate to sparsely hispid-pilose, not rough-hairy or scabrous. ..... (2)

   2. Basal leaves spatulate, 6-18 cm long, blades 2.5-6.5 cm wide, with a broadly winged petiole. ..... *P. notobellidiastrum*

   2. Basal leaves oblanceolate, 4-8(-15) cm long, blades 8-18(-20) mm wide, gradually tapering at the base, without a distinct, winged petiole. ..... *P. rivularis*

3. Leaves persistent at the base, the cauline sharply and strongly reduced upward. ..... (6)

3. Leaves more or less evenly distributed along the stems, the basal not persistent, little or gradually reduced upward, the margins strongly serrate, often coarsely toothed. ..... (4)

   4. Leaves linear to linear-lanceolate or linear-oblanceolate, 3-8 mm wide, slightly subclasping at base but not auriculate. *P. asperrima*

   4. Leaves oblanceolate to elliptic or oblong-lanceolate, 10-50 mm wide, distinctly auriculate-clasping at the base. ..... (5)

5. Cauline leaves 3-5 cm long, 10-20 mm wide. ..... *P. hirsuta*

5. Cauline leaves 6-11 cm long, 25-50 mm wide. ..... *P. regnellii*

   6. Leaves almost completely basal, broadly oblanceolate to nearly rotund, entire or barely crenate; stems and leaves scabrous with very short hairs. ..... *Podocoma* sp. nov. (see below)

   6. Leaves basal and lower cauline, mostly oblanceolate, shallowly to deeply serrate; stems and leaves hirsute or hirsute-pilose. ..... (7)

7. Rays white; achenes with a filiform neck. ..... *P. hieracifolia*

7. Rays yellow; achenes with a distinctly delimited, filiform neck or else not distinctly rostrate. .....(8)

8. Leaves shallowly crenulate or merely apiculate; heads 1-2(-3), on peduncles 5-11 cm long; achenes with a broad, tapering apex or sometimes slightly rostrate. ..... *P. bellidifolia*

8. Leaves sharply serrate; heads usually 2-10, on peduncles 1-7 cm long; achenes with a long, filiform neck. ..... *P. blanchetiana*

1. *Podocoma asperrima* Dusen *ex* Malme, Svensk Vet.-Akad. Handl., ser. 3, 12(2):63. 1933.

?*Podocoma spegazzinii* Cabrera, Notas Prelim. Mus. La Plata 1:327. 1931.

2. *Podocoma bellidifolia* Baker *in* Mart., *Fl. Bras.* 6(3):16. 1882.

Leucopsis podocomoides Baker *in* Mart., *Fl. Bras.* 6(3):6. 1882.

?*Podocoma foliosa* Malme, Svensk Vet.-Akad. Handl., ser. 3, 12(2):64. 1933.

3. *Podocoma blanchetiana* Baker *in* Mart., *Fl. Bras.* 6(3):15. 1882. *Haplopappus blanchetianus* Sch.-Bip. *ex* Baker (*pro syn.*) *in* Mart., *Fl. Bras.* 6(3):15. 1882.

4. *Podocoma hieracifolia* (Poir.) Cass., Dict. Sci. Nat. 42:60. 1826. BASIONYM: *Erigeron hieracifolius* Poir. *in* Lam., *Encycl. Method.* 8:491. 1808.

Podocoma primulifolia Cass., *Dict. Sci. Nat.* 42:61. 1826. *Erigeron primulifolia* Juss. [*in sched.*] *ex* Cass., *Dict. Sci. Nat.* 42:61. 1826.

Podopappus pubescens Hook. & Arn., Companion Bot. Mag. 2:50. 1836.

Podocoma erigerifolia Steud., *Nom. Bot.* (ed. 2) 1:584. 1840. (*pro syn. sphalm.* = *P. primulifolia* Cass.).

5. *Podocoma hirsuta* (Hook. & Arn.) Baker *in* Mart., *Fl. Bras.* 6(3):15. 1882. BASIONYM: *Podopappus hirsutus* Hook. & Arn., Companion Bot. Mag. 2:50. 1836.

6. **Podocoma notobellidiastrum** (Griseb.) Nesom, *comb. nov.* BASIONYM: *Conyza notobellidiastrum* Griseb., *Symbol. Fl. Argent.* 24:177. 1879. *Baccharidastrum notobellidiastrum* (Griseb.) Herter, *Rev. Sudamer. Bot.* 6:104. 1939. TYPE: PARAGUAY. Forets vierges pres de l'Aroyo Guazu, a l'est de la Cordillere de Villa-Rica, 21 Sep 1874, *Balansa 804* (HOLOTYPE: GOET?; Isotype: G-Delessert, photo-MO!, photo-US!).

   Erigeron paucifolius Less. [*pro syn.*] *ex* Baker *in* Mart., *Fl. Bras.* 6(3):34. 1882.

7. *Podocoma regnellii* Baker *in* Mart., *Fl. Bras.* 6(3):16. 1882.

8. **Podocoma rivularis** (Gardner) Nesom, *comb. nov.* BASIONYM: *Conyza rivularis* Gardner *in* Hook., London J. Bot. 4:124. 1845. *Baccharidastrum rivulare* (Griseb.) Herter, Rev. Sudamer. Bot. 6:104. 1939. *Erigeron gardneri* Cabrera (*nom. nov.*), Not. Mus. La Plata, Bot. 2:177. 1937; not *Erigeron rivularis* Sw. (1797) or Spreng. *ex* DC. (1836). TYPE: BRAZIL. *Gardner 520* (HOLOTYPE: BM; Isotype: B, photo-MO!, photo-US!).

9. *Podocoma sp. nov.*? ARGENTINA. Prov. Corrientes: Estancia Santa Teresa, "grasslands on rich 'black earth,' seems rare," 4 Jul 1962, *T.M. Petersen 1765* (US).

EXCLUDED SPECIES:

1. *Podocoma bartsiifolia* S.F. Blake, Contr. U.S. Natl. Herb. 20:534. 1924. = *Blakiella bartsiifolia* (S.F. Blake) Cuatr., Webbia 24:41. 1969.

   Moritzia Sch.-Bip. *ex* Benth. *in* Benth. & Hook., *Gen. Pl.* 2:279. 1873; non *Moritzia* DC. *ex* Meissn. (1840).

   Blakiella Cuatr. is a monotypic endemic of the paramos of Colombia and Venezuela (Cuatrecasas 1969). Schultz-Bipontinus's epithet "glandulosa" for this species (*in sched.*, as *Moritzia*) apparently was never published.

2. *Podocoma macrocephala* (Less.) Herter, *Fl. Uruguay Pl. Vasc.* [Estud. Bot. Reg. Urug.] 123. 1931. = *Asteropsis macrocephala* Less., *Syn. Gen. Comp.* 188. 1832.

   Asteropsis Less. is a monotypic genus endemic to Brazil and adjacent Uruguay (detailed comments, Nesom 1994a).

3. *Podocoma reineckii* Hochreut. *in* Briq. & Hochreut., Ann. Conserv. Jard. Bot. Genève 3:171. 1899. TYPE: BRAZIL. [Rio Grande do Sul]: "Pentes ensoleillees et pierreuses de la route de Tristeza," 15 Nov 1897, *E.-M. Reineck 119* (HOLOTYPE: G?; Isotype: P, photo-GH!, photo-MO!). = *Stenachaenium campestre* Baker, J. Bot. 16:79. 1878.

3. *Podocoma* in Australia = *Ixiochlamys* F. Muell. & Sonder *ex* Sonder.

Ixiochlamys is an Australian genus of four species (Grau 1975; Dunlop 1980).

4. *Inulopsis* O. Hoffm.

Grau (1977) noted that this South American genus should be considered a synonym of *Podocoma*, but no nomenclatural transfers have ever been made to formally unite the two taxa. *Inulopsis* is most recently treated as a genus of four species (Nesom 1994b).

ACKNOWLEDGMENTS

We greatly appreciate the manuscript reviews by Mark Mayfield, John Pruski, and B.L. Turner and help from the staffs of MO and US during recent visits to their institutions.

LITERATURE CITED

Baker, J.G. 1882. Compositae III. Asteroideae. *In* C.F.P. Martius, *Fl. Bras.* 6(3):1-36.

Cuatrecasas, J. 1969. Prima Flora Colombiana 3. Compositae - Astereae. Webbia 24:1-335.

Coleman, R. 1968. Chromosome numbers in some Brazilian Compositae. Rhodora 70:228-240.

Dunlop, C.R. 1980. A revision of *Ixiochlamys* (Asteraceae - Astereae). J. Adelaide Bot. Gard. 2:241-252.

Grau, J. 1975. *Podocoma* und *Vittadinia* - zwei vermeintlich bikontinentale Gattungen. Mitt. Bot. Staats. München 12:181-194.

———. 1977. Astereae - systematic review. *In* Heywood, V.H., J.B. Harborne, & B.L. Turner (eds.). *The Biology and Chemistry of the Compositae* 1:539-565. Academic Press, London, Great Britain.

Hunziker, J.H., A. Wulff, C.C. Xifreda, & A. Escobar. 1989. Estudios cariologicos en Compositae V. Darwiniana 29:25-39.

Nesom, G.L. 1994a. Comments on *Microgynella*, *Sommerfeltia*, and *Asteropsis* (Asteraceae: Astereae). Phytologia 76:101-105.

———. 1994b. *Inulopsis* synopsis (Asteraceae: Astereae). Phytologia 76:115-124.

Zanowiak, D.J. 1991. An analysis of systematic and phyletic relationships within the Baccharidinae (Asteraceae: Astereae). Ph.D. dissertation, Texas A&M University, College Station, Texas.